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/The Effect of Interoffice Network Structure on
Individual Experience of Problems/

Gordon Walker

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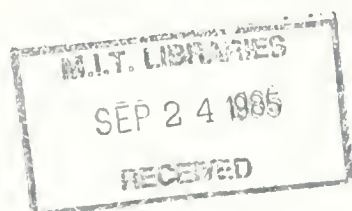
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ABSTRACT

The present study examines the effect of an interoffice network on the quantity and quality of problems which offices in the network receive. The network is composed of interoffice communications and problem referrals. It is demonstrated that office position in the network has a primary effect on problems received and that the location of the position in the network structure a lesser effect. Also, the results show the advantage of viewing structure in network terms.

The recent spate of interest in network approaches to the study of organizations has frequently been criticized as being driven more by technical than by substantive issues. One reason for this response may be that the network metaphor, which is essentially relational in character (Coleman, 1959), is often used to explain differences in individual, group or organizational attributes, and the connection in theory between specific relational and attributional phenomena is unconvincing. In the present study a relatively unexamined but pervasive phenomenon of a relational nature in organizations, the arrival of a problem at an office, is approached from a network perspective. The network structure of interoffice referrals and communications in an organization is used to explain differences in the quantity and quality of problems encountered by office members.

A major assumption of the present study is that the number of problems received by an office and the appropriateness of these problems for the office should be determined by the amount and quality of the information about the office available in the problem source no matter whether the source lies inside or outside the interoffice system. The focus of the present study is on the effect of the interoffice system on the number and quality of problems an office encounters.

The quality of a problem here means the extent to which an individual estimates that the problem can be solved by his/her office. Some offices may be confronted with few problems but those they get are virtually unsolvable with current means; other offices may get many problems which are, however, relatively easy to solve. Since the skills necessary for success in problem solving are maintained by obtaining a sufficient number

of appropriate problems, the quality and quantity of problems received by office members is relevant for their performance and the performance of their office. In the present study the interoffice network is assumed to be the means by which appropriate problems are acquired.

In a recent review of network models in sociology Burt (1980) makes a distinction between types of network approach and levels of analysis (see Table 1). He identifies two types of approach: positional and relational (not to be confused with the general relational approach, mentioned above, apparent in all network studies) . The present study approaches the interoffice network of an organization from a positional perspective and is concerned with this network as a structured system. The network is composed in this study of two types of relations: interoffice communication and problem referral.

Intraorganizational communication networks have been studied in terms of their relationship to group effectiveness (Tushman, 1977; Katz and Tushman, 1978; O'Reilly and Roberts, 1977), primarily at the individual level from a relational perspective consistent with information processing theory. Schwartz and Jacobsen (1977) examined the structure of an interpersonal communication network, focusing on the attributes of individuals who linked different groups. In contrast to these studies, the present research examines interoffice as opposed to interpersonal communications and is concerned with grouping offices on the basis of the similarity of their relationships with other offices in the network. A set of offices which are similar in their relationships should know about and be known by other offices similarly; given this kind of information distribution, such a set of offices should receive problems comparable in

their quantity and quality.

Intraorganizational referral networks have been proposed as a coordination mechanism in Galbraith's (1974) information processing view of organization design; hierarchical referral being the last resort for problem solvers in conflict over potential solutions. In the present research no assumption is made about the reasons for problem referral between offices other than the rather simple premise that the referring office has done all it can to solve a problem and is passing it on. Referral relationships between offices by definition contribute to the number of problems offices receive. Offices which have similar referral relationships with other offices in the network should receive a comparable number of problems.

A second major assumption of the present study is that offices which are classified together according to the similarity of their communication and referral relationships with other offices will receive a similar number of problems of comparable quality.

The structure of communications and referrals between sets of offices corresponds to the structured system of subgroups in Burt's typology. The third major assumption of the present study is that sets of offices in this structure will have relationships with each other of unequal intensity; in effect, this implies that sets of offices which have more intense relationships with other offices should receive more and better referrals.

From the assumptions stated above the following propositions can be made:

1. There will be differences in the number and quality of problems encountered by organizational members whose offices are classified into different sets according to the similarity of their interoffice communications and referral relationships.

The last assumption of the present research concerns the location of different sets of offices in the network: it is assumed that offices will vary in their degree of access to problems which originate outside the interoffice system and that sets of offices which contain offices with a high degree of access should encounter more problems than sets whose offices have low access. In addition, sets of offices located at a distance from high access offices in the communication and referral structure should encounter few problems of relatively poor quality. This assumption leads to the following proposition:

2. There will be differences in the quality and quantity of problems encountered by organizational members whose offices belong to different sets which are in different locations in the communications and referral structure.

The influence of the interoffice network on the number and kind of problems encountered by office members should be moderated by several individual and situational characteristics. First, the knowledge an office member has of other offices and of his/her/ own office and official position should affect the perception of the quality of the referral. Such knowledge would naturally increase the longer an individual was employed by the organization or in a particular office or position. Informal status associated with achievement may also increase an individual's access to information about the organization through contact with members of other

offices. Second, the general position of an office member within an office should affect the number and quality of problems encountered: a boss should receive fewer problems than his deputy, and his deputy fewer problems than the front-line secretary or receptionist. The difficulty of problems should likewise increase as they are passed up the intra-office hierarchy.

A model describing the general relationships between the variables in this study is presented in Table 2.

DATA AND METHODS

The data for this study consist of responses to a questionnaire from 86 members of 42 offices in a large eastern university. Not all members of each office responded; the largest number of respondents from a single office was six and the smallest number one. The offices were chosen on the basis of a snowball sample begun in several offices which were well-known. Problems which office members encountered and possibly referred were defined as students who arrived at the office with a problem. The final snowball sample size was 49; seven of these offices did not complete the questionnaire.

Office members were asked to indicate the number of students who came to them with a problem daily, the percentage of these problems which were solvable only by the respondent's office, the percentage partially solvable by the respondent's office, and the percentage totally inappropriate for his/her office. Respondents were also asked to indicate how frequently students were referred to other offices in the sample, to nominate at least five offices with which communications were frequent and to indicate the degree of frequency of face-to-face, telephone, and memo communications

with the offices nominated. Respondents also provided information on the number of years and months they had worked in their current positions, in their offices and in the university; they indicated their highest degree and their intra-office position (e.g. secretary, assistant administrator).

The first stage of the analysis was to classify offices into sets, hereafter called positions in conformity with the technical literature on the positional analysis of networks. The classification algorithm used was CONCOR, a method commonly used for the construction of blockmodels (Breiger, Boorman and Arabie, 1975; Arabie, Boorman and Levitt, 1979). As a general approach to network analysis, blockmodelling was chosen for several reasons: 1) blockmodelling techniques are specifically directed at representing networks in terms of a structure of interrelated positions, each position consisting of a number of network members (in the present case network members are offices); 2) the primary principle, called structural equivalence, behind blockmodels as a representation of networks is consistent with the theoretical perspective on referral networks developed above; 3) among positional approaches to networks at the subgroup system level the technique of blockmodels has the most extensive and well developed published literature.

Responses regarding interoffice relationships were dichotomized, and the responses of the members of an office were combined to form a single indicator of office to office relationships. The input to CONCOR was an array of four stacked binary matrices, one matrix for interoffice referrals and one for each mode of interoffice communication.

The output from CONCOR is always a bifurcation of the columns of the input array. CONCOR was run on the two groups produced by the initial run and twice more on groups produced by these runs so that in all six disjoint sets or positions of offices were derived. The composition of these groups is presented in Table 3. The degree to which offices in each position refer students to and communicate with each other and offices in other positions is represented in the set of density matrices in Table 4a. The blockmodels for these matrices are shown in Table 4b.

To test the proposition that the number and quality of problems encountered by office members whose offices were in different positions would not be the same, analyses of covariance were run with the number of students, and the percentage of solvable problems, of partially solvable problems and of inappropriate problems as dependent variables. The independent variables were the position of the respondent's office in the network, his/her position in the office (polychotomized into three levels), and his/her level of education (polychotomized into five levels). The covariates were the total number of months employed in the university, in the office, and in his/her current position in the office. The results of the analyses of covariance are shown in Table 5.

The proposition regarding the effect of the network structure on the number and quality of problems was tested in a two part procedure. First, although the blockmodels constructed from the density matrices indicate some consistency in the structural location of each position, these locations could not be interpreted precisely enough to lead to a confident testing of the second proposition. Consequently, in order to determine which positions were structurally similar, each density matrix was appended with

its transpose so that the first six columns constituted densities to the six positions and the last six columns densities from the six positions. The appended matrices were then stacked, and the intercolumn correlation matrix of the stacked array was factor analysed. The results of the factor analysis are found in Table 6. Three groups of positions were taken from the factor analysis results; positions within these groups were interpreted as sharing a location within the structure. Analyses of covariance were then run using the same variables as in Table 5 except that the office positions were replaced by groups of office positions. Table 7 contains the results of this analysis.

RESULTS

The classification of offices into positions shown in Table 3 is easily interpreted. Position I is composed of three top administrative offices and a powerful dean's office. Position II consists primarily of direct student service functions, and Position III of the undergraduate school dean's offices. Financial and lesser administrative service functions are spread across Positions II and III. Religious groups and operational offices of the university constitute Position IV. Position V is composed of the offices which administer residential life on campus, plus one residence and a student-run service group, and other undergraduate residences comprise Position VI.

The analysis of covariance results in Table 5 demonstrate rather strikingly the influence of office position on the number and quality of problems encountered by office members. Office position has a significant effect on all four dependent variables; and only for the perception of inappropriate problems are the context factors significant.

The factor analysis of the stacked, appended density matrices produced three factors with eigenvalues greater than one, which accounted for 83% of the variance. A Varimax rotation produced factor loadings which indicate that each factor represents a distinct group of positions. With a factor loading cut off of .4, factor one represents the second and third positions, factor two the fourth, fifth and sixth positions, and factor three the first position. Factors one and three are confounded each by a single loading which detracts from the otherwise perfect interfactor discrimination.

The results of the analysis of covariance in which positions were grouped according to the similarity of their location in the network structure are slightly different from the ANCOVA results using ungrouped positions. Variation in the number of students encountered was not explained significantly by the groups of positions. As in the initial analysis of covariance with the positions ungrouped, no other independent variable or covariate explains variation in the number of students. The results for problem quality are similar to those of the ungrouped analysis. Groups of positions have a significant effect on the perception of the solvability of student problems and, to a lesser degree, on the perception of partial solvability. In terms of level of significance, the results for the inappropriateness of a problem are identical to the first analysis. Thus, the number of problems encountered varies significantly among office positions but not among groups of positions determined by network structure. Problem quality, on the other hand, is explained both by positions and by groups of positions.

DISCUSSION

In the present study problems are encountered by individual office members; however, the constructs proposed as explanators are groups of offices and groups of groups of offices. The level of the office itself is jumped in favor of the network characteristics of offices both in terms of an initial clustering of offices into positions on the basis of the similarity of interoffice relationships and in terms of a grouping of positions on the basis of their similarity in the interpositional structure.

The results of both classifications were quite interpretable but for different reasons. The positions constructed in the first classification can be understood in terms of office functions. The mapping of function onto position is an obvious virtual isomorphism for the present data. However, the empirical classification of offices according to their communication and referral relationships should not be trivialized in favor of an a priori functional understanding of the organization. One result which the present scheme produces in a much richer form than would an a priori functional approach is the network structure.

In the present study positions were grouped in terms of the similarity of their structural location with a relatively high degree of discrimination, considering that network relations both given and received by a position loaded on the same factor. One reason for this result is the general symmetry of the network structure along the main diagonal for all four types of relation. A second reason for the coherence of the factors is the distinct grouping of the positions themselves in the network. The blockmodels on the modes of communication make clear in a visual way the separation of the first and last three positions. In the blockmodel for

referrals, moreover, one can see the tightly knit group of positions two and three and the group of positions five and six. Apparently, the relationships of position one with the other positions on all four types of relation are sufficiently different for it to merit its own group. Considering the membership of this position, such a finding is understandable.

The separation of positions into such clearcut groups suggests a relative degree of organizational stratification. The strata, or groups of positions explain variance in the qualitative aspect of individual referral experience but not the quantitative aspect. Unaggregated positions, on other hand, explain variance in both the quantitative and qualitative aspects.~

These results suggest that although an office may change the number of problems it receives by altering its relationships with other offices and thus altering its position in the interoffice network, it is less likely that the quality of problems encountered will change since an alteration of position does not necessarily mean a change in structural location.

CONCLUSION

The present research has focused on an interoffice communication and referral network as distinguished from interpersonal relations. Contrary to most studies using universities as sample organizations (Pfeffer and Salancik, 1977; Katz, 1979), the present study has used primarily non-academic offices; consequently, the structure presented can be considered the result of administrative as opposed to professional concerns. In this regard this study meets in part the need for empirical descriptions of administrative structure as a set of interrelated offices.

As defined in this study problems are students who arrive at an office with problems the office may or may not be able to solve. The relationship of this definition to perceptions of task or job is not specified; however, it seems likely that problems defined as an input to an office would tend to affect perceptions of the office problem-solving system. In this sense the quality and quantity of problems referred mediate the effect of the interoffice network structure on individual perceptions of task and job characteristics. Analogous types of problems in non-educational organizations are employee complaints and problems initiated by clients.

Finally, problem referral may be seen as a type of interoffice dependence since without a place to send what is locally unsolvable, an administrative unit decreases in value perceived by its constituency and perhaps in actual effectiveness as well.

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TABLE 1

CONCEPTS OF NETWORK STRUCTURE WITHIN EACH OF SIX MODES
OF NETWORK ANALYSIS (from Burt, 1990)

ANALYTICAL APPROACHES	ACTOR AGGREGATION IN A UNIT OF ANALYSIS		
	ACTOR	MULTIPLE ACTORS AS A NETWORK SUBGROUP	MULTIPLE ACTORS/ SUBGROUPS AS A STRUCTURED SYSTEM
RELATIONAL	PERSONAL NETWORK AS EXTENSIVE, DENSE OR MULTIPLX	PRIMARY GROUP AS A NETWORK CLIQUE: A SET OF ACTORS CONNECTED BY COHESIVE RE- LATIONS	SYSTEM STRUCTURE AS DENSE AND/OR TRANSITIVE
POSITIONAL	OCCUPANT OF A NETWORK POSITION AS CENTRAL AND/OR PRESTIGIOUS	STATUS/ROLE- SET AS A NETWORK POSITION: A SET OF STRUCTURALLY EQUIVALENT ACTORS	SYSTEM STRUCTURE AS A STRATIFICATION OF STATUS/ROLE SETS

TABLE 2

Model of Relationships Between

Interoffice Networks and

Problems Encountered by Offices

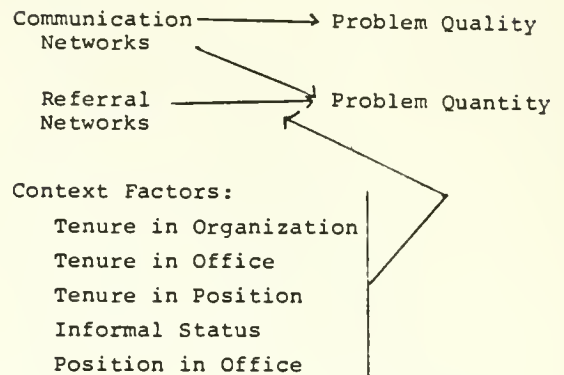


TABLE 3

Office Membership in Positions

Position 1	Position 2	Position 3	Position 4	Position 5	Position 6
Off of Pres	Registrar	Admissions	Vice Provost	Stud Activities	Residence 1
Off of Provost	Fin Aid	FAS Advising	Stud. Agencies	Residence 2	Residence 3
Sec to Corp.	Support Serv	Student Loans	Dining Services	Dir of Frats	Residence 4
Dean of Fac of Arts and Sci	Student Health	Dir of Lib	Op Services	Dir of Res Life	Residence 5
	Univ. MH	Col of Gen Stud.	Security	Consumers Bd.	Residence 6
	Univ. Placement	App. Med. Prof.	Christian Ass.	Univ. Judiciary	Residence 7
	Career Adv.	Bus. School	Hillel	Dir. of Res.	
	Reading Clinic	Engineering	Newman Hall		
		Nursing	(Catholic)		

TABLE 4

a. Density matrices for 4 types of interoffice relations

Referrals						Comm - face to face					
.19	.03	.14	.03	.04	0	.5	0	.06	.09	0	0
.16	.36	.42	.06	.07	0	.13	.11	.06	0	.04	0
.17	.43	.32	.01	.11	.07	.14	.11	.11	.03	.02	0
.06	.14	.04	.16	.18	0	.09	.08	.01	.14	.09	.02
.04	.13	.05	.09	.33	.31	.07	.04	.02	.14	.22	.14
0	.17	.07	.13	.43	.19	.04	.02	.02	.21	.24	.03
Comm - telephone						Comm - memo					
.38	0	.06	.09	0	0	.5	0	.11	.06	0	0
.19	.08	.07	.02	.07	0	.13	.06	.08	0	.04	0
.25	.17	.09	.04	0	0	.19	.15	.06	.07	.02	0
.09	.03	.01	.11	.11	0	.03	0	0	.11	.04	.02
.07	.07	.02	.14	.20	.14	.07	.05	.02	.11	.10	.05
.04	0	.02	.19	.21	.03	.04	.02	.02	.13	.14	.03

TABLE 6

Results of Factor Analysis
on Appended Density Matrices

Position	Rotated Factor Loadings		
	1	2	3
all → 1			
all → 2	.05	-.06	.94
all → 3	.91	-.02	.27
all → 4	.89	-.05	.35
all → 5	.09	.69	.27
all → 6	-.17	.90	-.26
1 → all	-.02	.94	-.14
2 → all	.19	-.27	.89
3 → all	.88	.11	-.31
4 → all	.96	-.05	.03
5 → all	-.62	.41	-.19
6 → all	-.19	.68	-.57
Eigenvalue	5.13	3.19	1.65
% of var.	43	27	14

b. Blockmodels for each density matrix.

 $\alpha > .31$

Referrals

0	0	0	0	0	0
0	1	1	0	0	0
0	1	1	0	0	0
0	0	0	0	0	0
0	0	0	0	1	1
0	0	0	0	1	0

 $\alpha > .09$

Comm- face to face

1	0	0	1	0	0
1	1	0	0	0	0
1	1	1	0	0	0
1	0	0	1	1	0
0	0	0	1	1	1
0	0	0	1	1	0

 $\alpha > .09$

Comm - telephone

1	0	0	1	0	0
1	0	0	0	0	0
1	1	1	0	0	0
1	0	0	1	1	0
0	0	0	1	1	1
0	0	0	1	1	0

 $\alpha > .065$

Comm - memo

1	0	1	0	0	0
1	0	1	0	0	0
1	1	0	1	0	0
0	0	0	1	0	0
1	0	0	1	1	0
0	0	0	1	1	0

TABLE 5

F-values of Analyses of Covariance for Ungrouped Positions

* - p<.1
** - p<.05

Dependent Variables

Independent Variables	Problem number	Problem solvability	Problem part solv.	Problem inappropriate
Months in University	.77	4.03*	.10	.94
Months in Office	1.16	1.23	.63	54.19**
Months in Position	.29	1.50	.17	19.59**
Degree	.05	.33	.62	5.46**
Individual Position	1.43	.33	2.52	7.04**
Office Position	2.79**	3.57**	4.62**	28.10**
Degree by IndPos	.93	.81	.39	1.53
IndPos by OffPos	.97	1.26	.65	3.40**
Degree by OffPos	.94	.81	1.17	.62
Degree by IndPos by OffPos	1.32	2.09	1.25	1.43

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TABLE 7

F-values of Analyses of Covariance for Grouped Positions

* - p<.1
** - p<.05

Dependent Variables

Independent Variables	Problem number	Problem solvability	Problem part solv.	Problem inappropriate
Months in University	.68	3.78*	.07	.86
Months in Office	1.03	1.15	.45	49.49**
Months in Position	.26	1.41	.12	17.89**
Degree	.88	.79	1.44	4.76**
Individual Position	1.52	.10	1.04	2.65*
Office Position	1.41	5.20**	2.47*	53.66**
Degree by IndPos	.39	1.64	.96	1.56
IndPos by OffPos	.14	1.41	1.04	3.74**
Degree by OffPos	.31	1.70	.33	1.70
Degree by IndPos by OffPos	1.76	.27	.49	.12

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